Plan Formulation for Deep Draft Harbors

Planning and Formulation Considerations

Topics to be Discussed

- Plan Formulation Function for Deep Draft Navigation
- Federal Interest
- Basic Concepts
- Problem Identification
- Inventory and Forecast
- Determination of Objectives and Constraints

Plan Formulation

- Lead planning process
- Identify problems
- Set planning objectives
- Define existing condition
- Define future with and without project conditions
- Develop alternatives
- Conduct trade off analysis
- Apply cost sharing requirements
- Technical Integration
- Prepare Feasibility Report
- Facilitate review process and issue resolution

Federal Interest

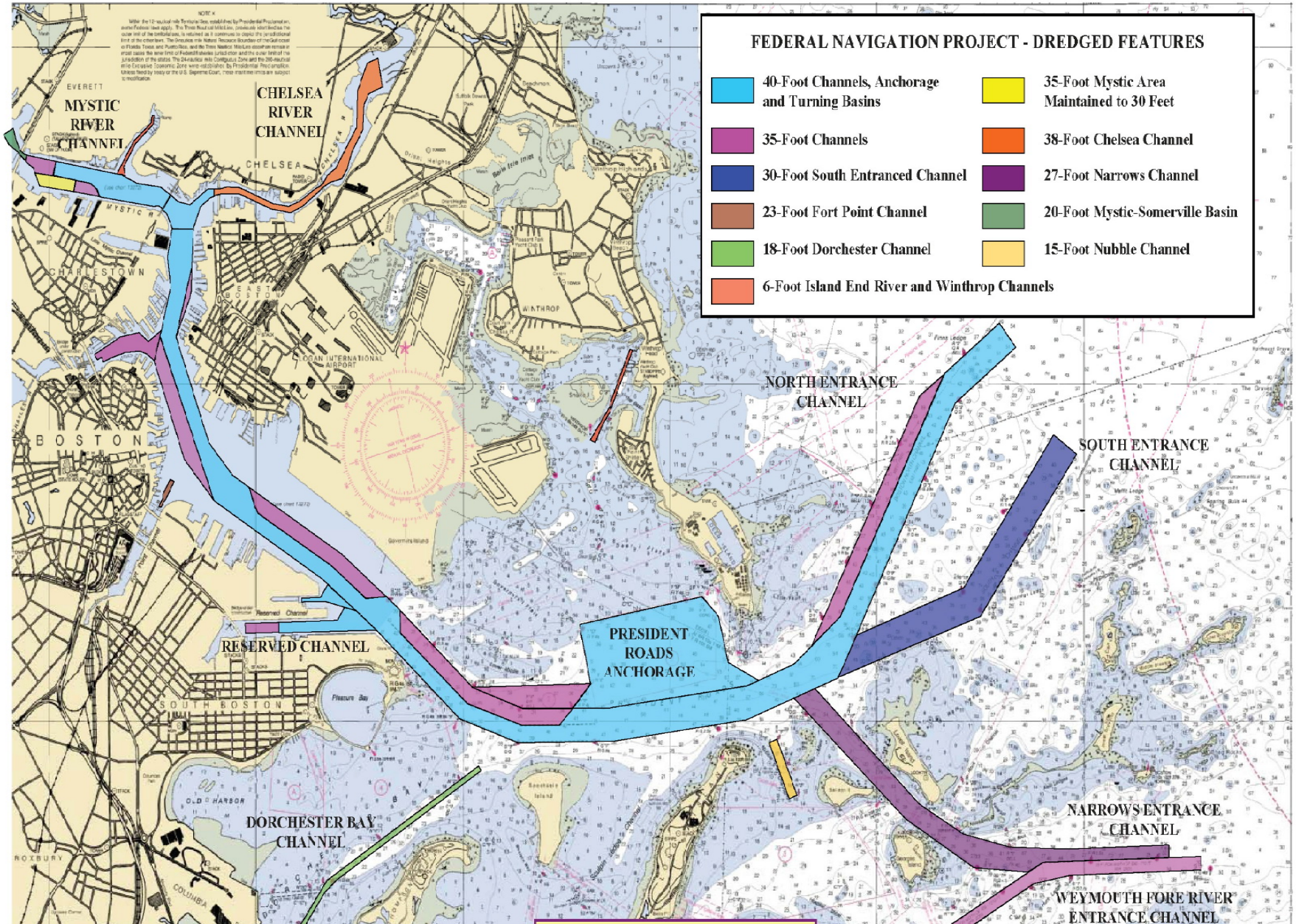
*"The **role** of the U. S. Army Corps of Engineers with respect to navigation is to provide safe, reliable, and efficient waterborne transportation systems (channels, harbors, and waterways) for movement of commerce, national security needs, and recreation. The Corps accomplishes this mission through a combination of capital improvements and the operation and maintenance of existing projects."*

-ER 1105-2-100

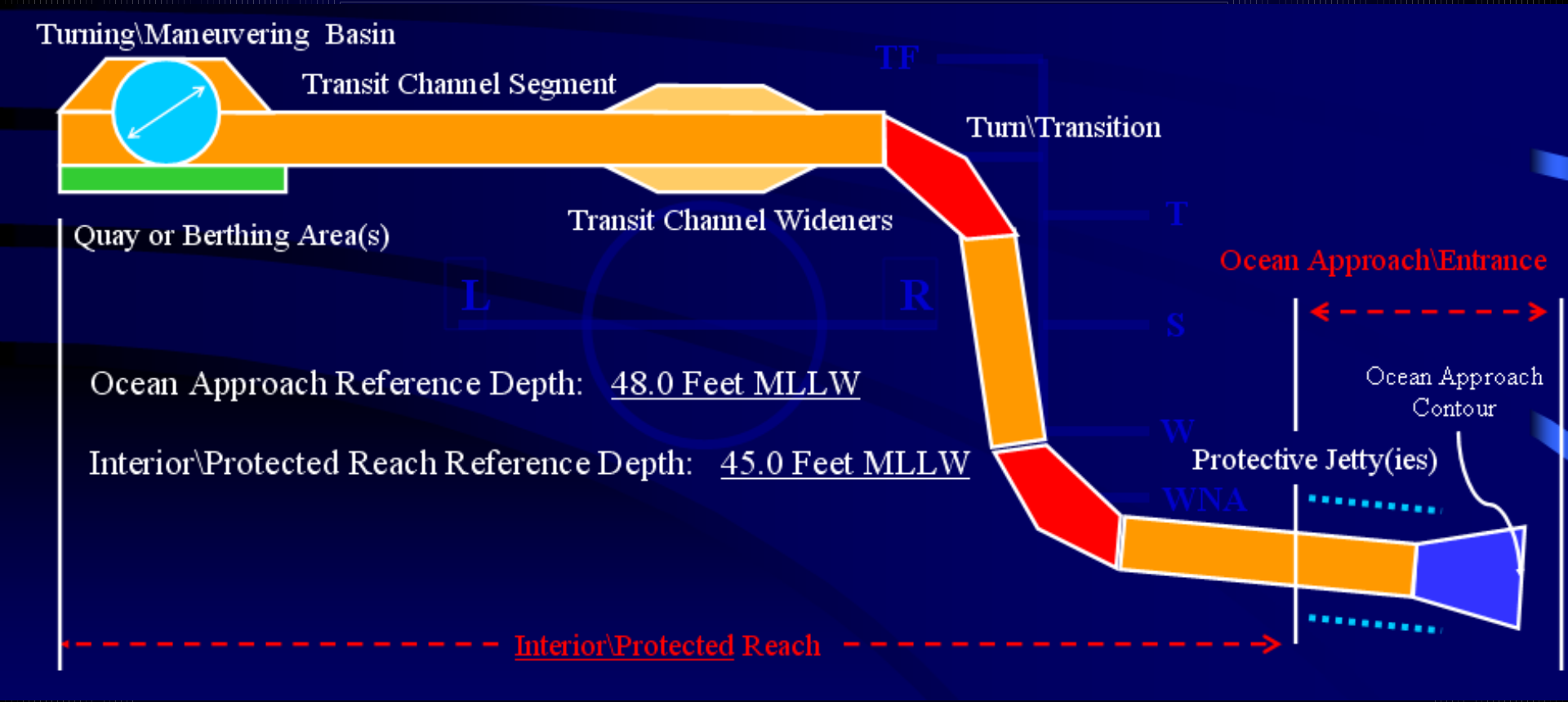
Basic Concepts
Deep-Draft Navigation

- Harbor and port systems and their hinterlands
- General navigation features
- Types of deep draft vessels
- Basic vessel characteristics
- Channel characteristics

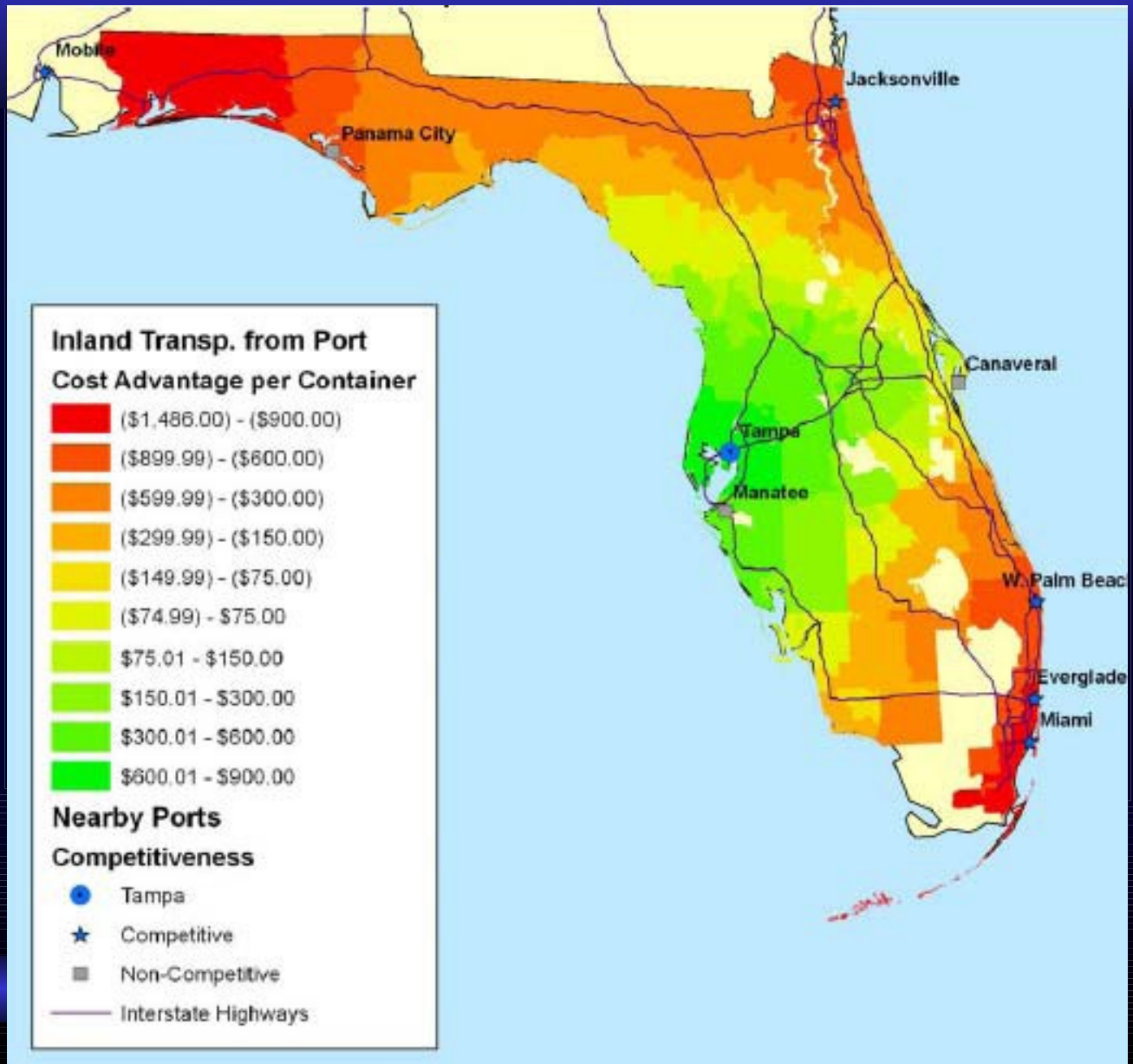
Boston Harbor, Massachusetts



Harbors and Ports



Hinterlands



Hinterlands
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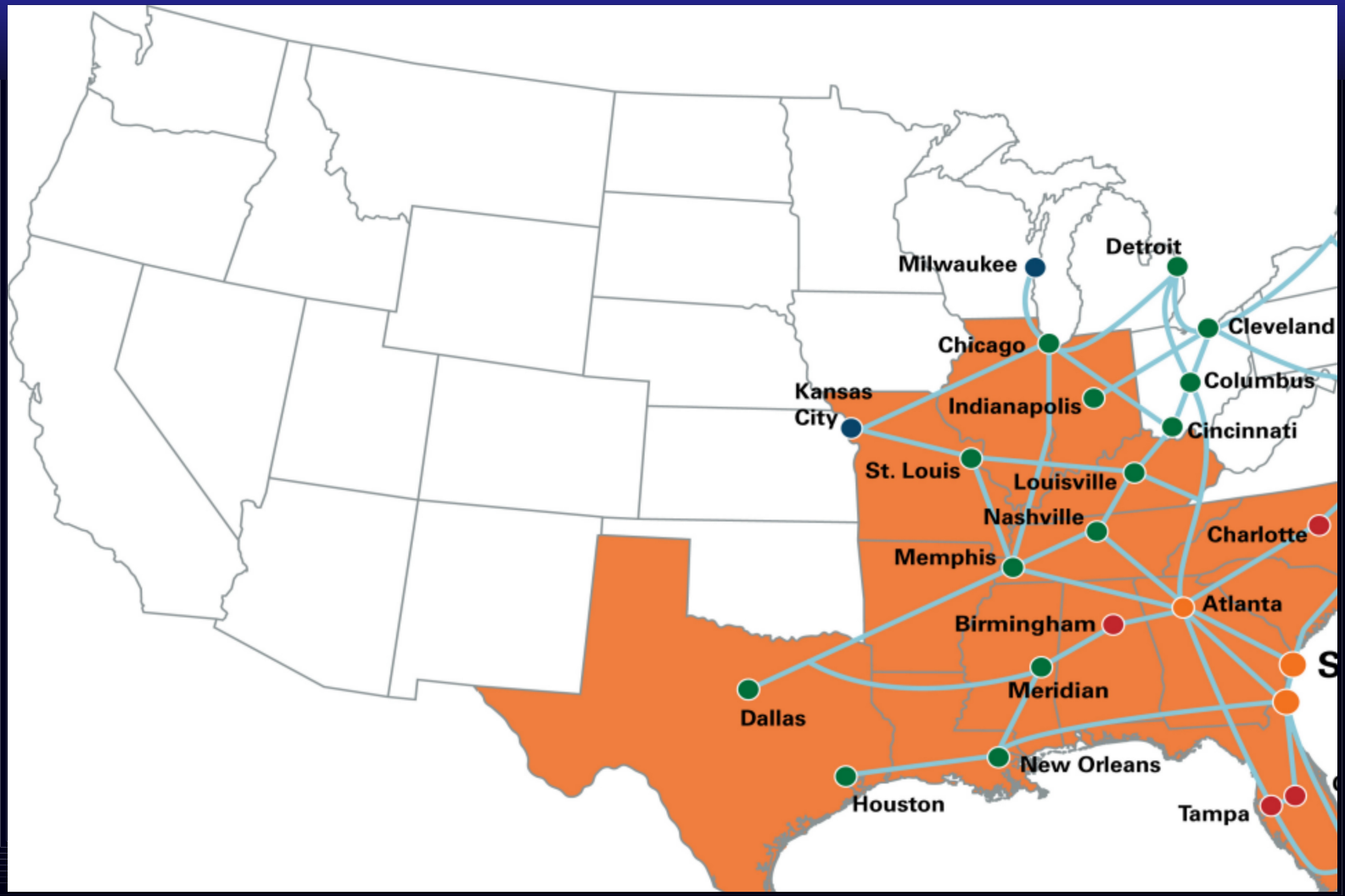

Break Bulk Vessel

Bulk Carrier

Tanker

Containership

Roll On/Roll Off Vessels

Liquefied Natural Gas Tanker

Liquefied Natural Gas (LNG)

Cruise Ships

Vessel Characteristics

- Type of Vessel: container, general cargo, tankers, etc.
- Length Overall (LOA)
- Beam Width
- Draft
- Height
- Deadweight: weight of vessel
- TPI (Tons per inch) immersion
- Design Draft of Vessel
- Gross Registered Tonnage: internal vessel capacity
- Speed (at sea and at port)
- Fuel Type and Consumption

Topics to be Discussed

- Basic Concepts
- **Problem Identification**
- Inventory and Forecast
- Determination of Objectives and Constraints

Development of Problem Statements

- May not be the same for all stakeholders
- Sort out real versus perceived problems
- For current and future
- Problem statement should include:
  - full description (e.g., answers who, what, where, when, why, how)
  - Who considers it’s a problem

Symptoms of Problems

- Physical Condition
- Traffic Delays
- Light Loading
- Lightering
- Safety Issues

Problems May Arise From Channel Configurations

- Depth/width
- Turning Areas
- Shoaling
- Location
  - Bends
  - Currents

Dredged Material Disposal Problems

- Capacity
- Cost
- Environmental Concerns

Topics to be Discussed

- Basic Concepts
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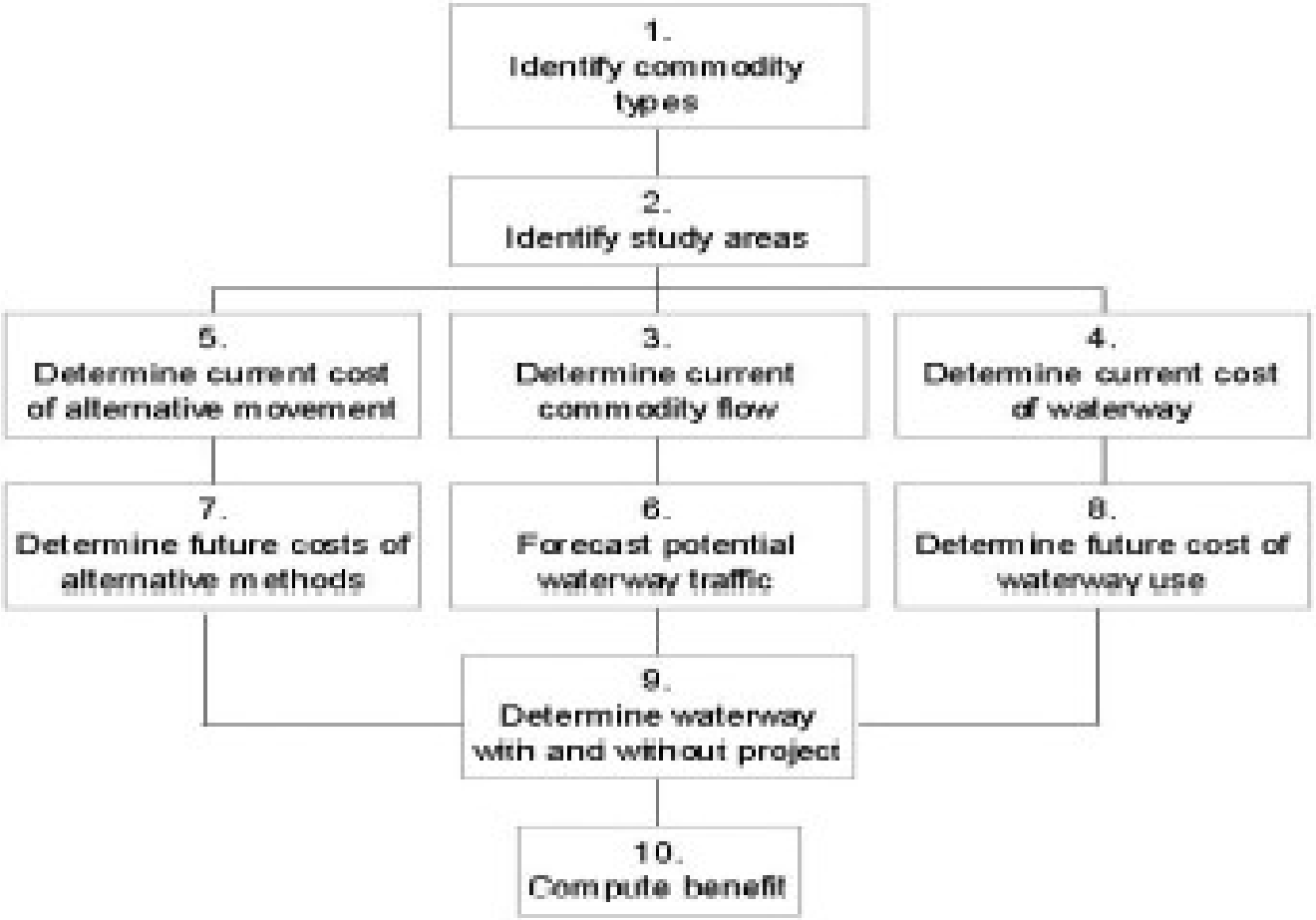
Deep Draft Navigation Benefit Evaluation Procedure



Information Gathering

- Types
  - Inventory
  - Forecast
- Uses
  - Defines **relevant conditions** in planning area under various scenarios
    - Historic (support rapid & sustained growth)
    - Existing
    - Base year
    - Most likely future with a project
  - Identify constraints

Institutional Setting Example: Stakeholder Groups

New York Harbor

- Public Institutions
  - Corps, USCG
  - Port Authority of New York and New Jersey
  - States, New York City, Newark, Bayonne
- Private Organizations
  - Carriers, Carrier Alliances, Pilots Associations
  - International Longshoreman’s Association
  - New York Shipping Association
  - Maritime Association of the Port of NY & NJ
  - Harbor Safety, Navigation, and Operations Committee
  - Environmental Groups

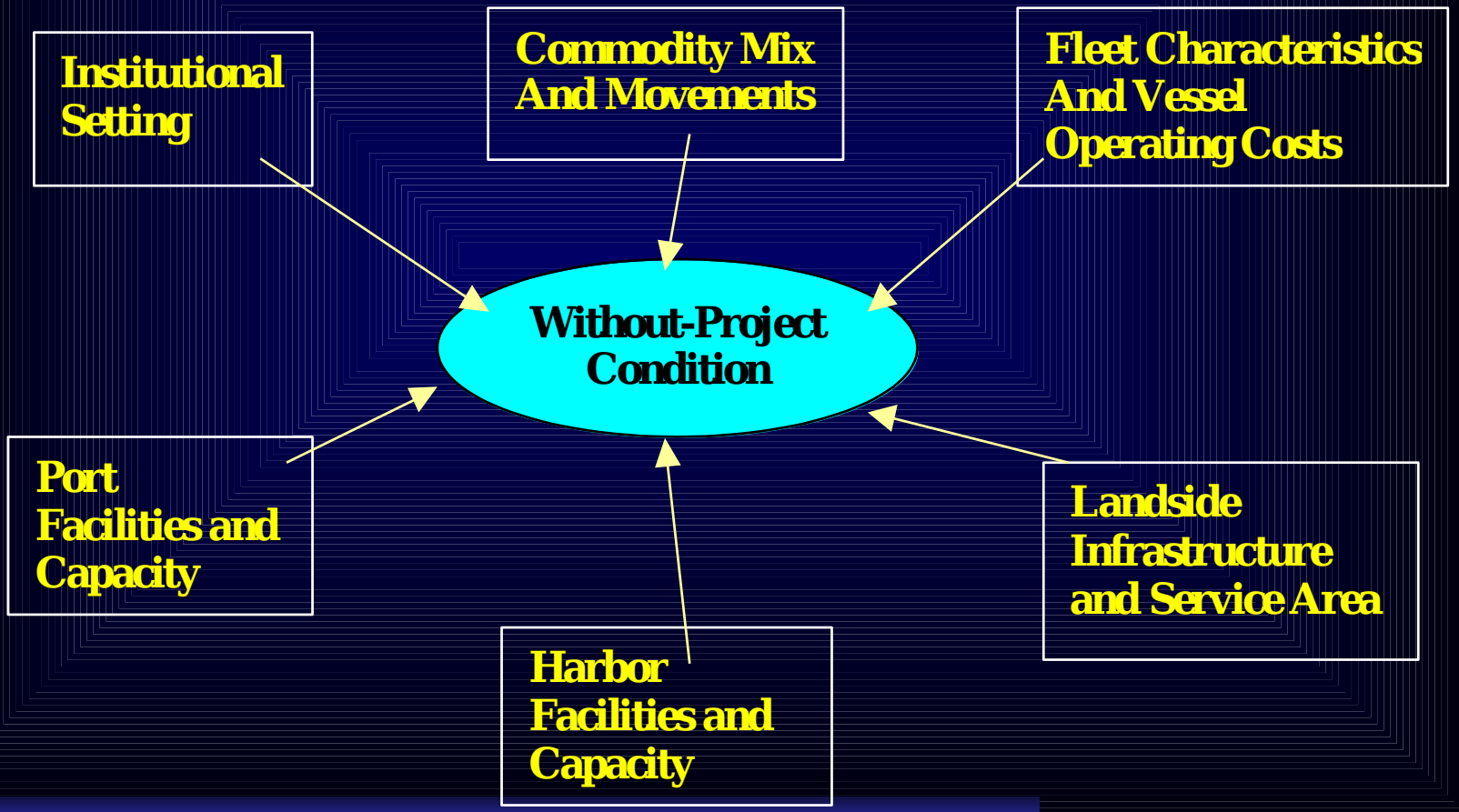
U.S. Coast Guard

- Underkeel clearances can be imposed by harbor and port authorities, Bar Pilots, or the Coast Guard as a safety measure
- Marine accident records are available
- Modification of Bridges that Obstruct Navigation (P.L. 76-647, Bridge Alteration Act)
  - Currently this program is administered by the Coast Guard
  - Economic evaluation is performed using U.S. Department of Transportation benefit-cost criteria
- Aids to Navigation

Forecasting

- Forecast establishes the without project condition
- Economic benefits are dependent on forecasting
- Future demands are dependent on assumptions and the assumptions must be clearly articulated
- If you build it will they come? There must be supporting data
- Long-term solution versus short-term

Developing the Without-Project Condition



Port Characteristics

- Terminals
- Berthing Dimensions
- Terminal Capacities
- Port Institutions
- Master Plan
- Data source - Port Series

Characteristics for Commodities Affected by Delays/Capacity

- Commodity movement
  - Commodity categories
  - Origin/Destination
  - Annual volume
  - Inland modes involved
- Alternative mode information
- Trading patterns

Vessel Information

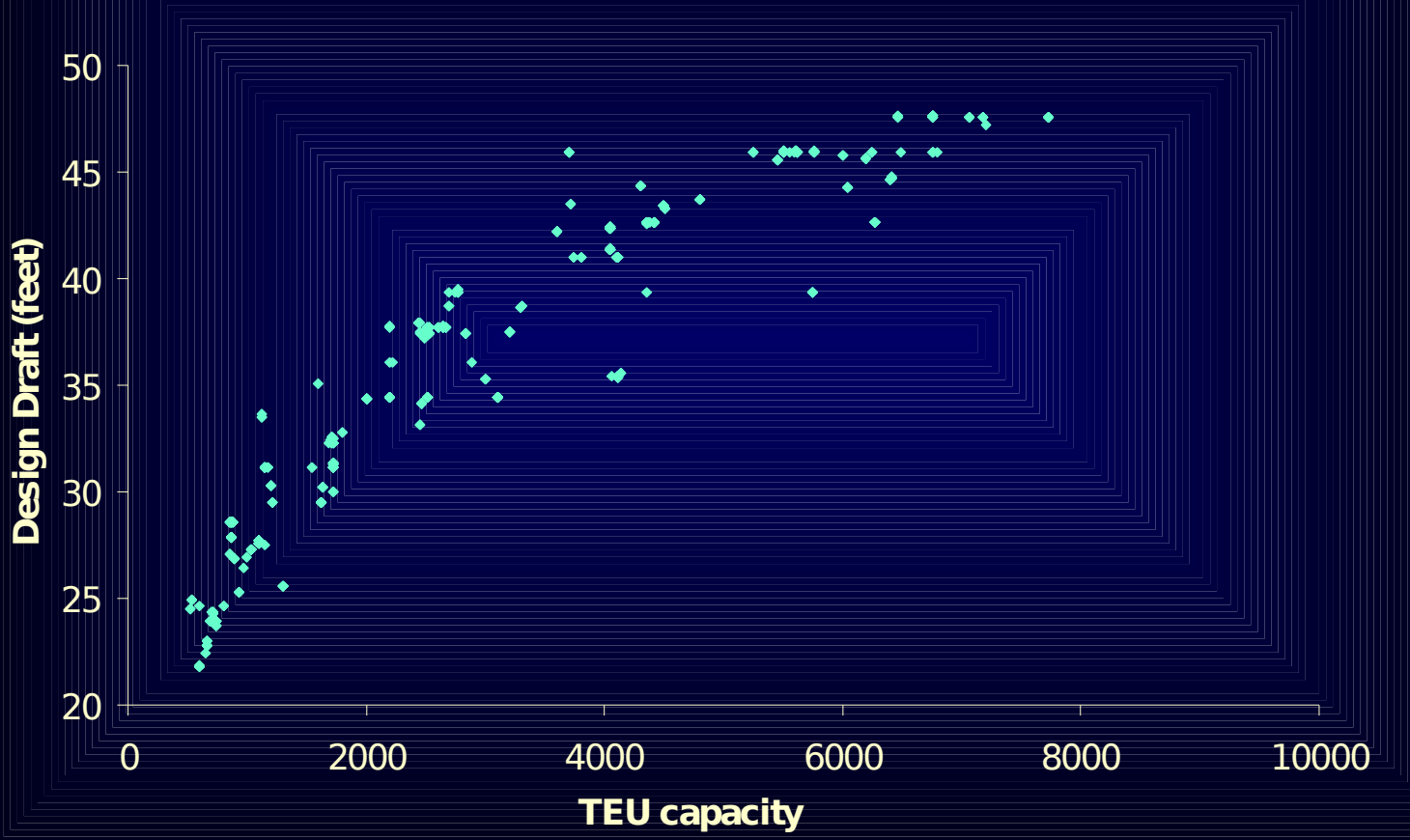
- Port vessel fleet
- Vessel size data
- Vessel operating drafts
  - limited by general navigation feat
  - design versus operating
- Vessel capacity utilization
- Light loading analysis
- Vessel itinerary
- Vessel operating costs
- Changing legal requirements

Lightering

Forecast of Fleet Mix – 2 Components

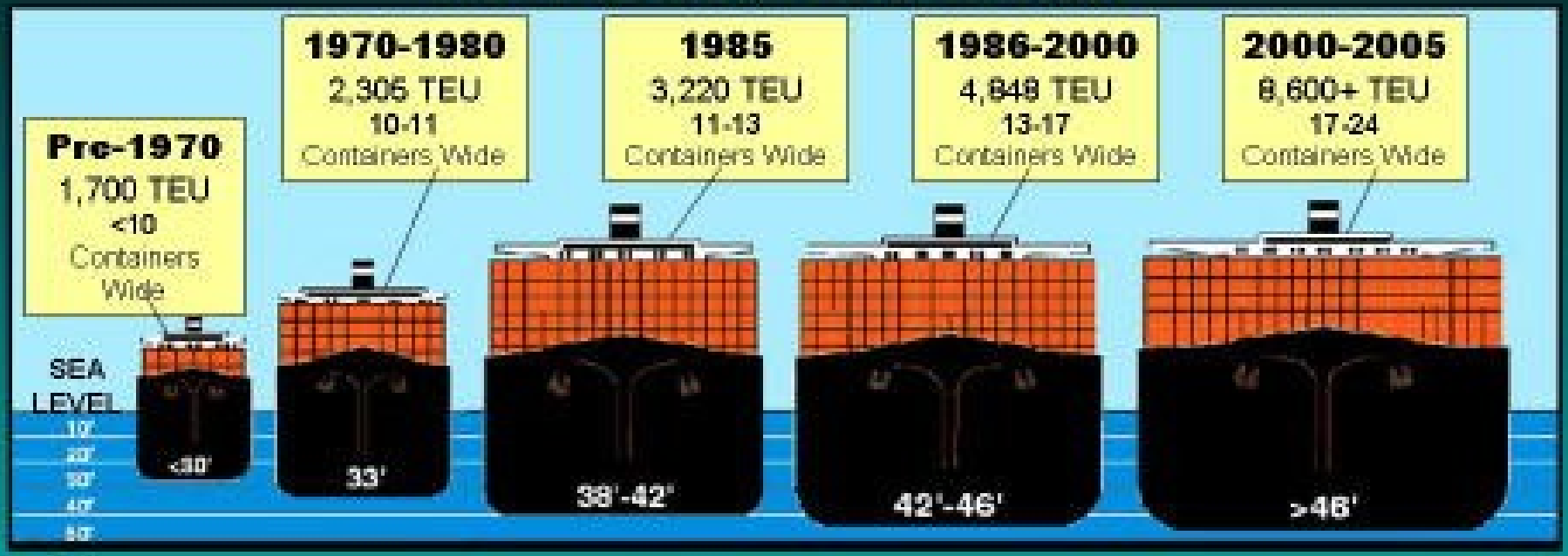
- World fleet mix
  - Commercially available by industrial experts
  - Needs to be disaggregated to the port level
- Port fleet projections
  - Trend analysis – Need to ensure that ships are available which could be going to other ports/trade routes
  - Distribution accounting - Need a wide enough distribution of vessel sizes in the fleet mix

Distribution of Design Draft and TEU Capacity

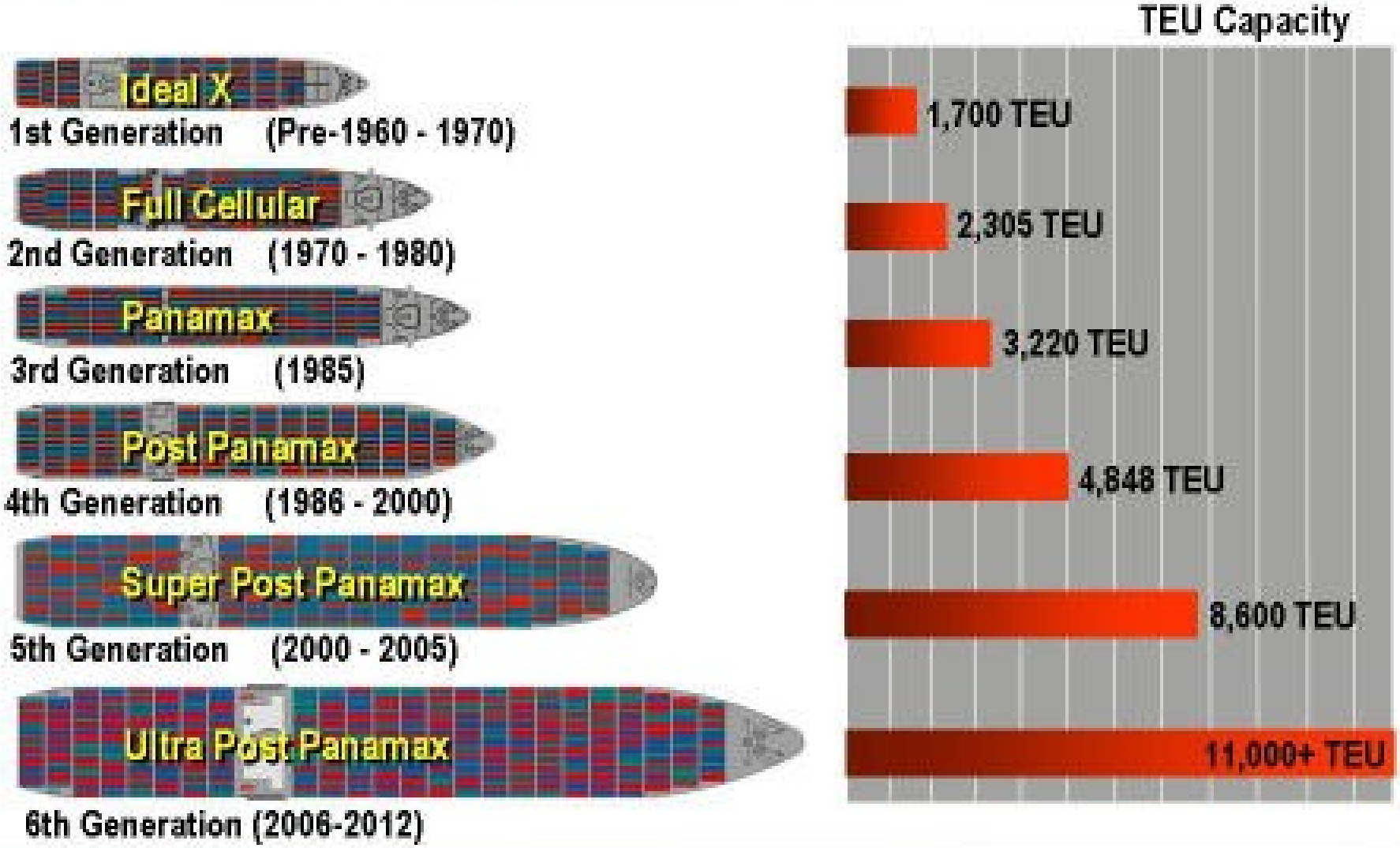


Today's Mega Ships - Measuring Up

How Wide, How Deep?



World Container Ship Evolution



Large Containership Depth Requirements

Vessel Class	4000 TEU	7500 TEU
Design Draft	43	48
Underkeel Clearance	4	5
Required Depth	47	53
Estimated Light Loading	3	3
Actual Required Depth	44	50

What Next – 18,000 TEU

- Mearsk Triple E Class
- 400 m long
- 59 m wide
- 2 engines, top speed 23 knots
- Designed to sail Europe to Asia
- Largest vessel of any type known to be in operation

Large Containership Depth Requirements

	Triple E	Emma Maersk
Vessel Class	18,000 TEU	15,500 TEU
Design Draft	?	30 m
Beam	59 m	56 m
Length	400 m	397 m
Engines	2	1
Potential cost savings	44	50

Existing Annual Transportation Costs

- Ship operating costs
- Origin-to-destination costs
  - Transit costs
  - Delay costs
- Landside/Port costs

Commodity Forecasts

- By type
- By volume
- By origin and destination
- By transportation mode
- Consult with IWR

Topics to be Discussed

- Basic Concepts
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Planning Objectives

- Properties of objectives
  - Flexible - Accommodate alternative ways to achieve
  - Measurable – not nebulous
  - Attainable
  - Congruent – not rule out other objectives
- Avoid specifically seeking the solution

Planning Objectives
Sabine-Neches Waterway
Feasibility Study

- Improve the navigational efficiency along the waterway
- Maintain the ecological values of coastal and estuarine resources within the project area

Planning Objectives
Port of Iberia, Louisiana

- Develop the most effective plan for providing deep draft access to the POI from the Gulf of Mexico.
- Use dredge material to beneficially restore bank line and create marsh.

Planning Objectives Corpus Christi Ship Channel, Texas

- To improve the efficiency and safety of the deep-draft navigation system, and
- To maintain or enhance the quality of the area’s coastal and estuarine resources.

Planning Objectives
Miami Harbor, Florida GRR

- Determine if sufficient light loading, tidal delay, or other commercial navigation benefits exist to deepen the Federal system of channels from existing project depths of 42 and 44 feet to depths of 50 and 52 feet;
- Evaluate components which would reduce the impact of variable and unpredictable crosscurrents in the area of buoy 1 at the beginning of the entrance channel and at the Fisher Island turning basin where three channels converge;
- Examine components to reduce or eliminate the surge effect on ships docked at the Lummus Island terminals from other passing ships in Fisherman's channel;
- Determine if the proposed components meet the needs of future commercial ship navigation requirements;
- Identify environmental and cultural resources in the study area and potential impacts from deepening or widening to those resources;
- Review the impact of proposed components on the existing harbor maintenance and future dredged material management plans; and
- Identify the NED plan for Miami Harbor, which most efficiently and safely accommodates larger vessels while preserving

Planning Objectives
Boston Harbor Feasibility Study

- Contribute to National Economic Development by minimizing the cost of transporting existing cargo volumes and anticipated future increases in cargo volumes to and from New England in an environmentally acceptable and sustainable manner during the 2014 to 2064 period of analysis.
- Reduce current and expected future tidal delays for the existing and anticipated future fleet of container and bulk cargo vessels calling at Boston Harbor during the 2014 to 2064 period of analysis by examining improvements to channel, anchorage and turning basin dimensions and local berths and facilities.
- Reduced current and expected future light loading requirements for vessels calling at Boston Harbor during the 2014 to 2064 period of analysis by examining improvements to the harbors general navigation features and local service facilities.

Planning Objectives
Boston Harbor
(continued)

- Reduce current lightering requirements and potential future increases in lightering for petroleum tank ships calling at Boston Harbor during the 2014 to 2064 period of analysis by examining improvements to channel dimensions in the Chelsea River.
- Maximize the beneficial use of dredged material for habitat creation and other purposes during the 2014 to 2064 period of analysis covering initial construction and future maintenance of the project.
- Consider all the previously identified opportunities in the formulation and evaluation of alternative plans, and recommend the preferred means of achieving the above-listed objectives, consistent with the Federal interest as set forth in the Principles and Guidelines, during the 2014 to 2064 period of analysis.